

xTCA at the Computing Sector

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Outline:

What is xTCA?

Why is Computing Sector working on it?

What will we do with it?

What is xTCA?

xTCA is a family of specifications to support electronic systems for applications needing:

- Flexibility

- Extendability

- High availability

“TCA” means “Telecommunications Computing Architecture”

Originated in the telecom market but is expanding beyond telecom

Specifications include

- Basic interconnection topologies

- Equipment management and operation requirements

AMC Form Factors

“AMC = Advanced Mezzanine Card”

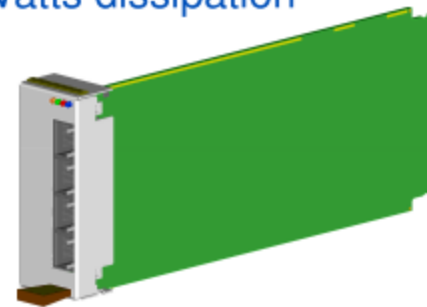
Single-Width/Half-Height
up to 20 Watts dissipation

≈ 3" x 7"



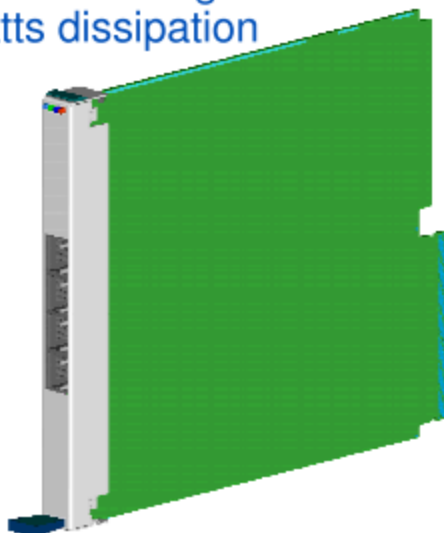
Targeted as the
DSP platform

Single-Width/Full-Height
up to 40 Watts dissipation

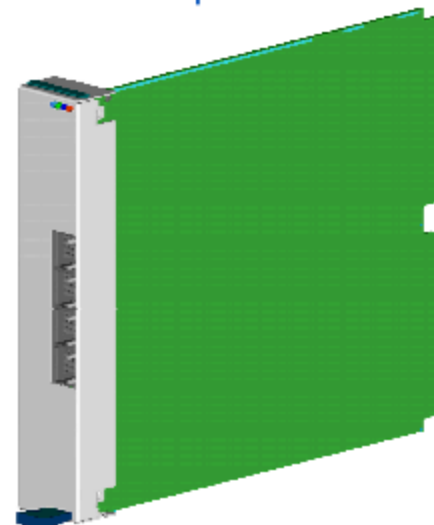


Double-Width/Half-Height
up to 40 Watts dissipation

≈ 6" x 7"



Double-Width/Full-Height
up to 80 Watts dissipation



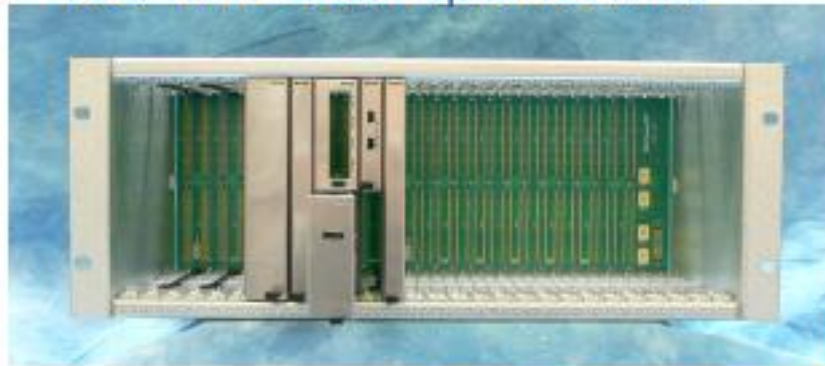
The AMC ECN committee is planning to introduce the mid-size form factor

μTCA Equipment Configurations

75 mm Shelf up to 24 AMCs



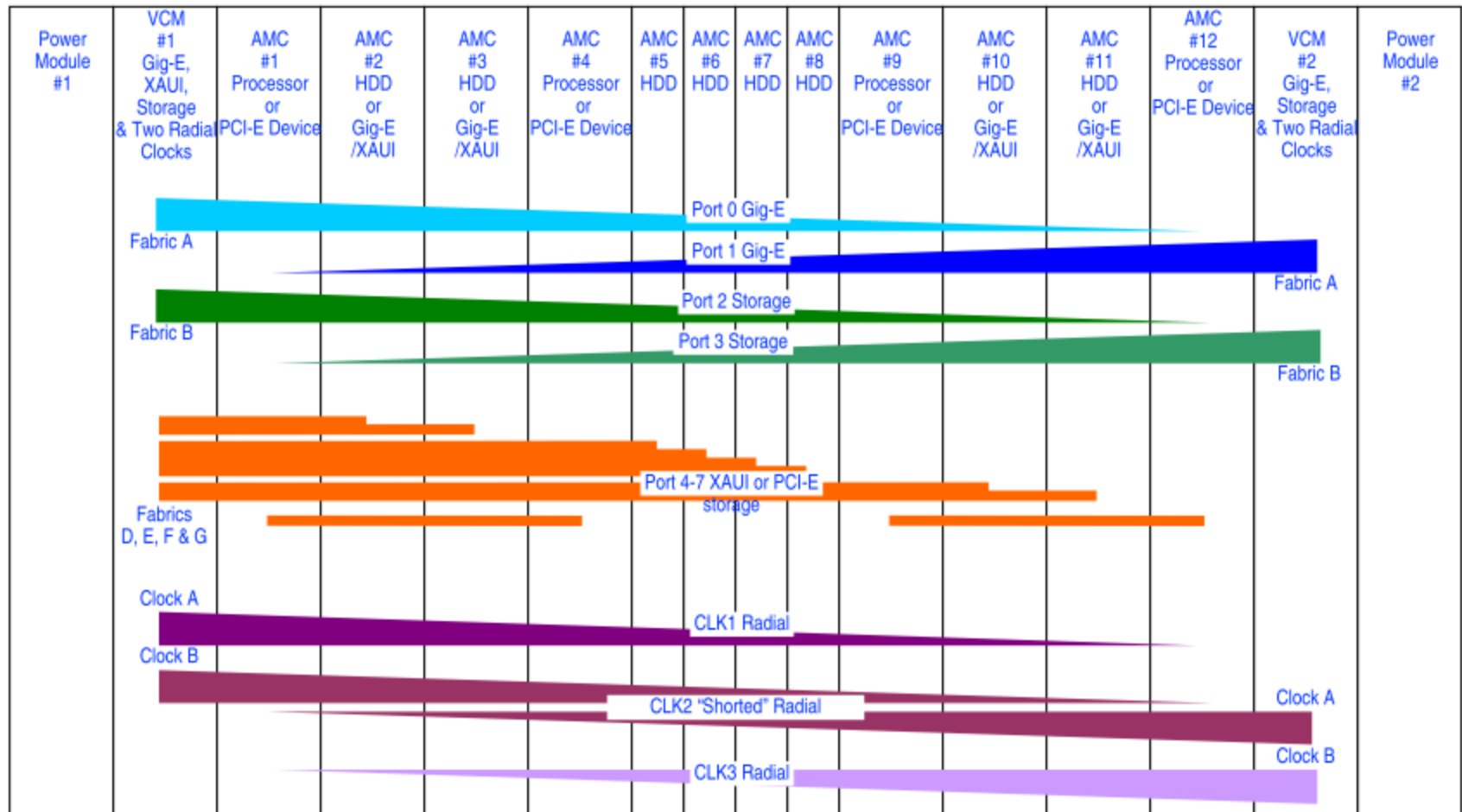
150 mm Shelf up to 48 AMCs



Configuration calls for:

- At least 1 Power Module
- At least 1 Carrier Hub
- Up to 12 AMC cards
- At least 1 cooling unit

MicroTCA Topologies



MicroTCA Prototype for Bus & Board 1/06
Connectivity Diagram

What is Computing Sector Interested in xTCA?

LHC experiments are planning future upgrades around xTCA

ATLAS is focusing on ATCA

CMS is focusing on μ TCA at the moment

To prepare for participation in these upgrades, ESE has embarked upon its own program to learn and use the technology

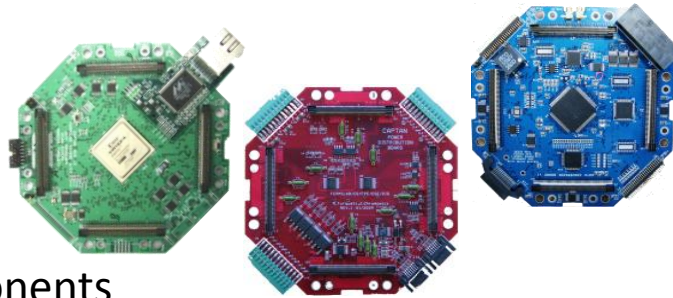
These activities include

Internal development (CAPTAN AMC, FIONA)

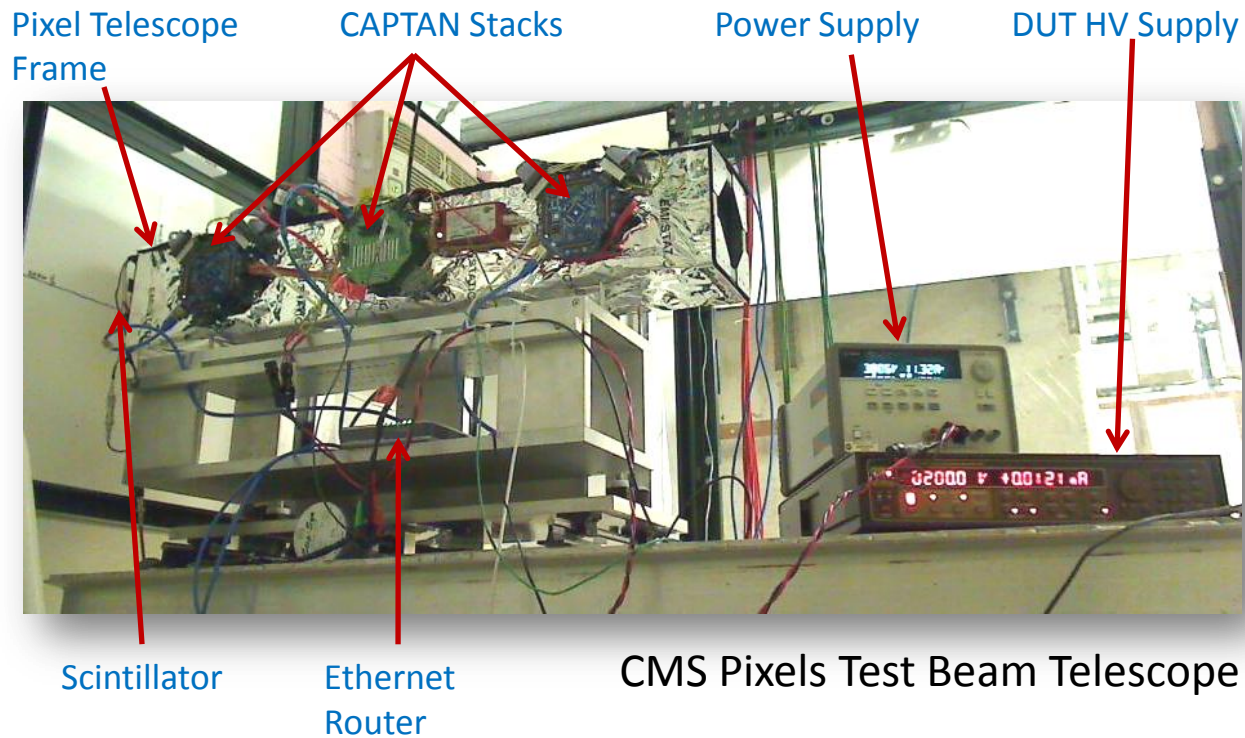
Utilization of “3rd party” products (GLIB, CMS Phase I FED)

Note: There is ongoing debate about ATCA vs μ TCA

ESE and μ TCA CAPTAN AMC for Real Time Event Building



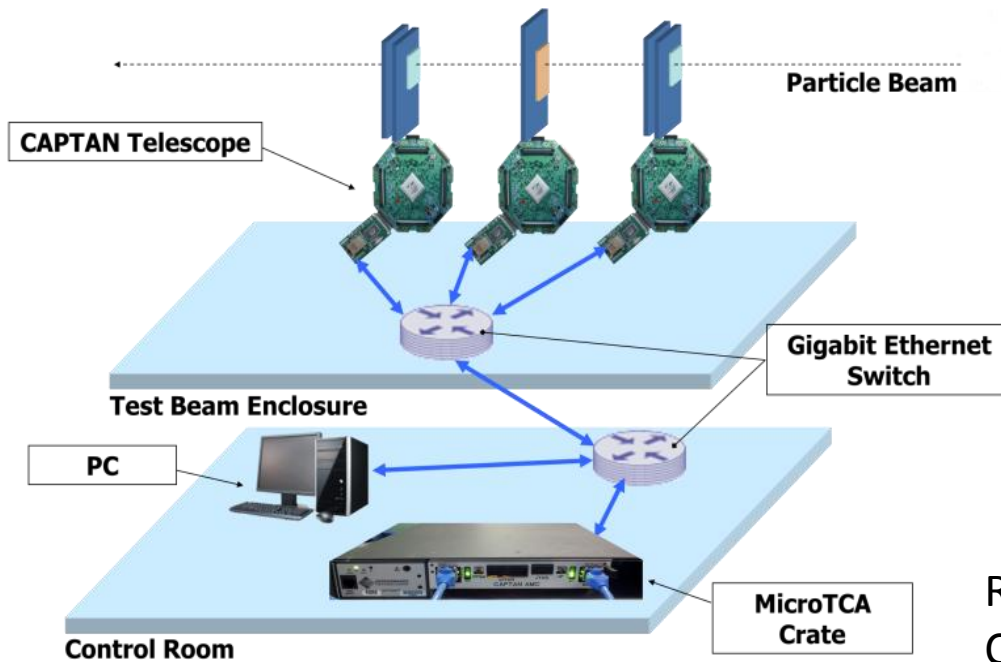
CAPTAN DAQ Components



ESE and μ TCA

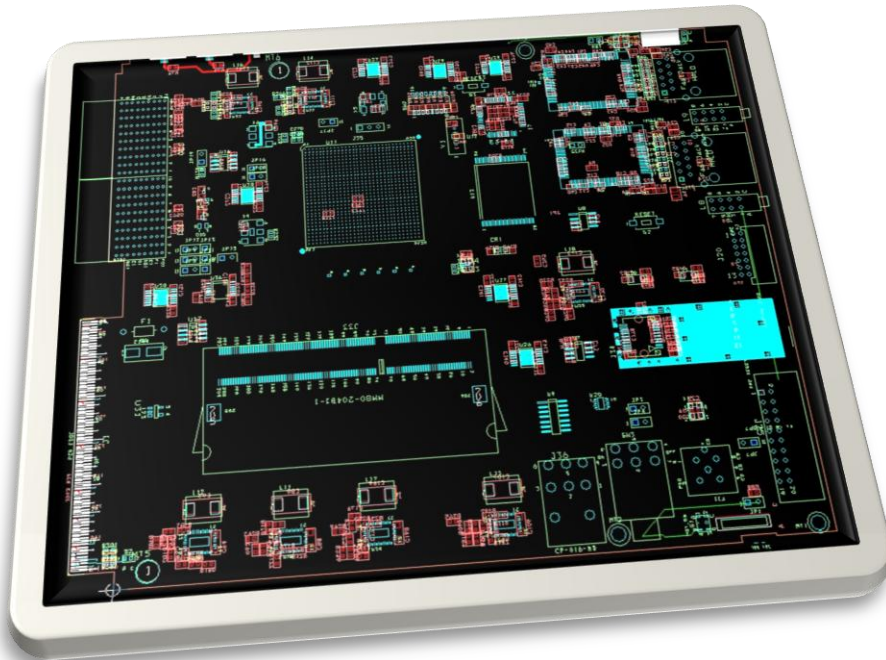
CAPTAN AMC for Real Time Event Building

CAPTAN Advanced Mezzanine Card



Real Time Events are built in the
CAPTAN AMCS in the μ TCA Crate

ESE and μ TCA – Fast IO Networked AMC (FIONA)



Upgraded FPGA with MultiGigabit SerDes

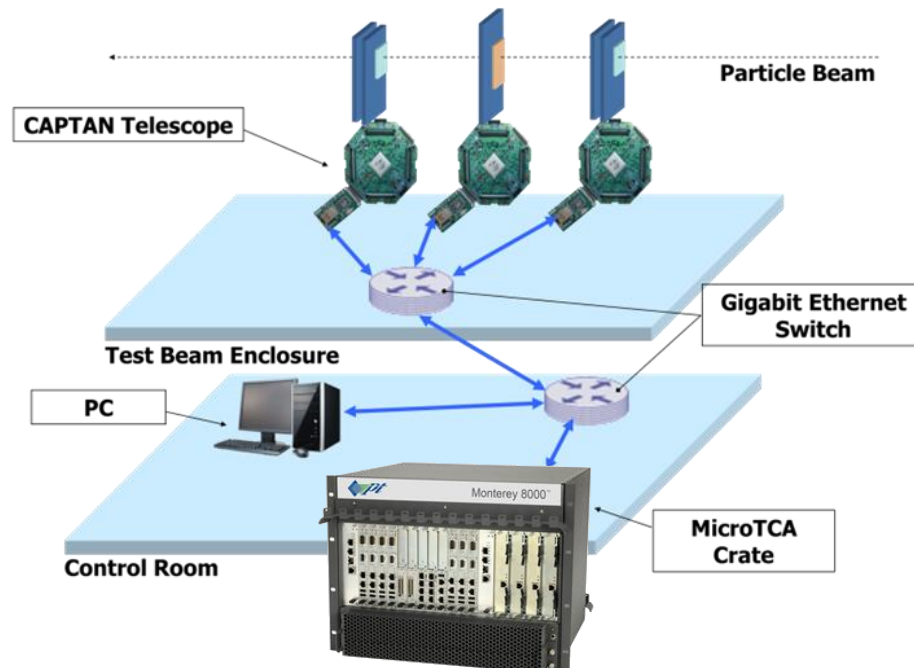
DDR3 Memory Onboard

Rear Transition Module (μ TCA Physics Extensions)



FIONA Future Work

- We plan to use 1-3 FIONAs in the mTCA.4 carrier to conduct real-time tracking in a test beam environment.



Gigabit Link Interface Board (GLIB)

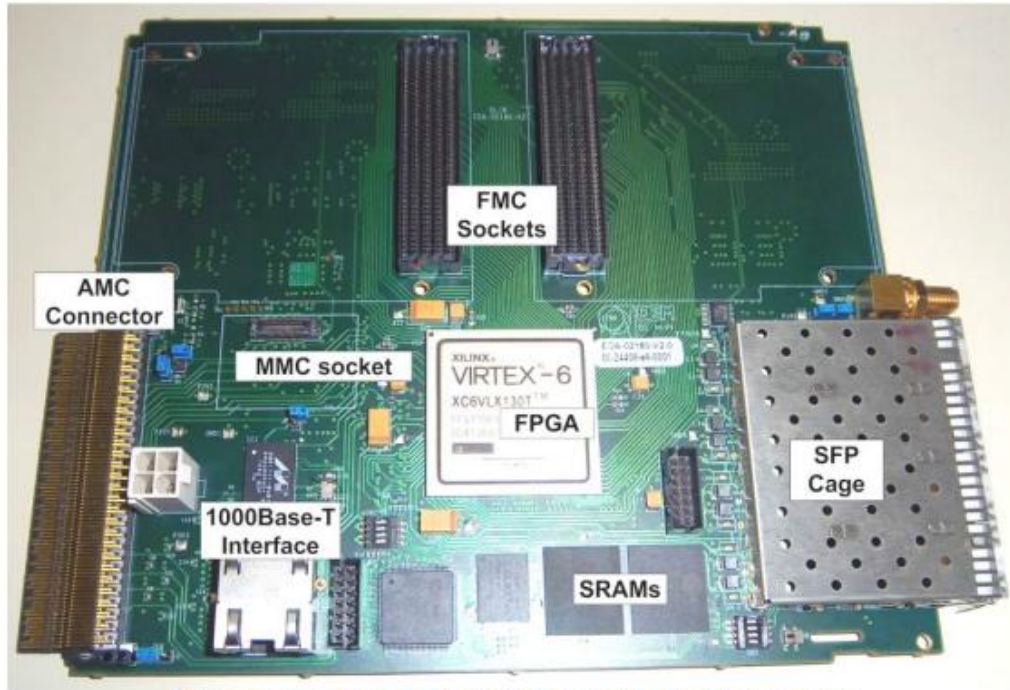


Figure 1-3: Picture of the GLIB prototype highlighting its major components.

GLIB AMC

For high speed optical link test

Implements GBT Protocol

GLIB Ecosystem:

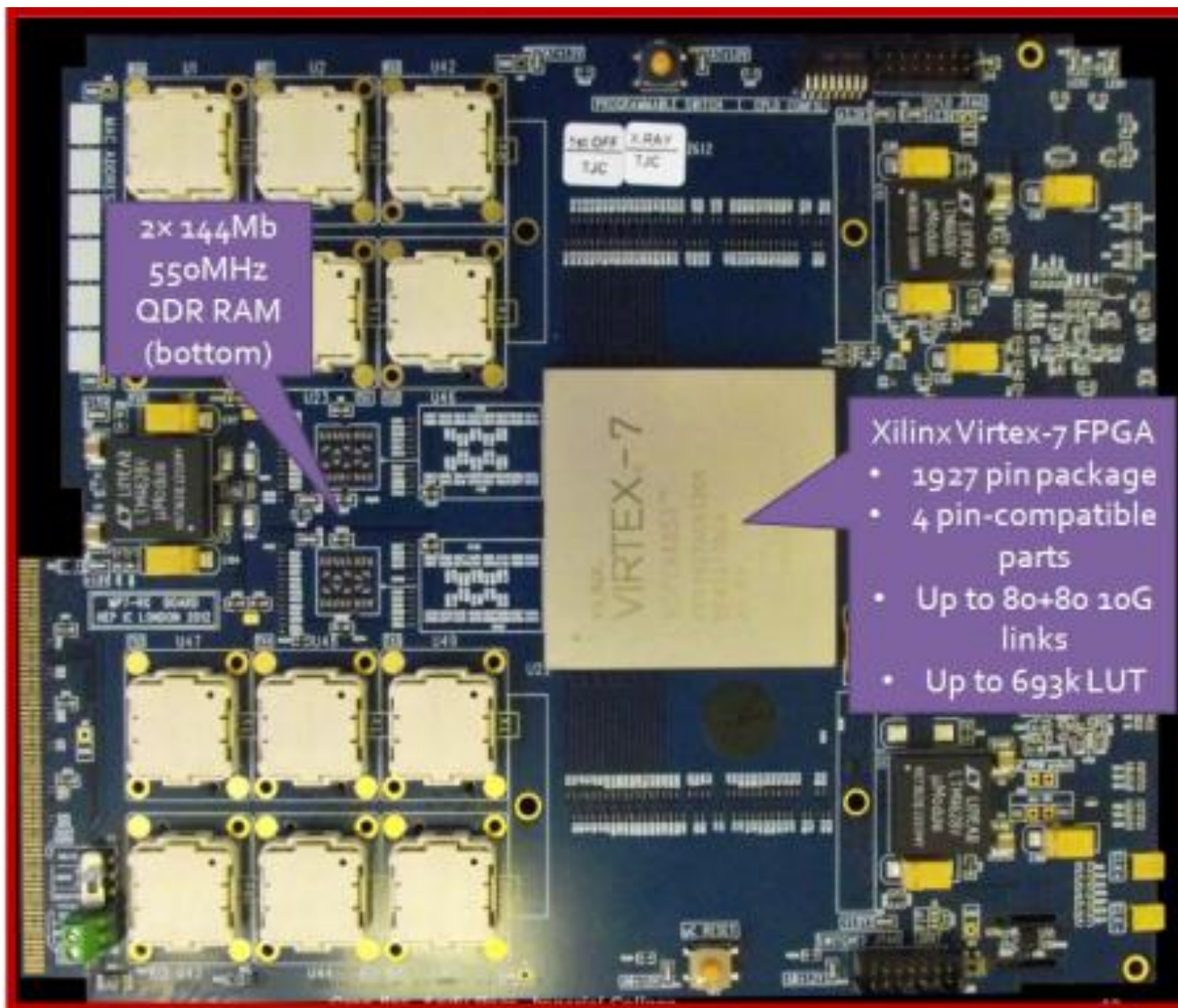
FMC Cards for expanded features

ESE has developed multiple
FMC modules for optical
communications



CMS Pixels Phase I Upgrades

Front End Data (FED) Board - Imperial College MP7 Prototype



xTCA Conclusions

We expect this technology to be a strategic addition to our engineering skills

We will continue to pursue our internal developments with an eye to the future (e.g., HL-LHC)

ESE continues to pursue leadership in lab efforts to utilize xTCA